



**FACULTY OF SCIENCE
DEPARTMENT OF INDUSTRIAL CHEMISTRY**

**CHM 102- INTRODUCTORY ORGANIC CHEMISTRY TUTORIAL (CBT FORMAT)
2021**

JULY

NB: MOST OF THESE QUESTIONS (Around 80%) CAME OUT IN 2021 CHEMISTRY EXAMINATION

Expect Around This % as well.

**ATTACHED TO THIS DOCUMENT IS THE SOLUTION OF THE QUESTIONS + EXPLANATIONS BY B.SC
(07014312797)**

1. Which of the following is true for the basicity of amines?
 - (a) Alkylamines are generally less basic than arylamines because N is sp hybridised
 - (b) Arylamines are generally more basic than alkylamines due to aryl group
 - (c) Arylamines are generally less basic than alkylamines due to delocalisation of lone pair of electrons in the benzene ring
 - (d) Alkylamines are generally less basic than arylamines because lone pair of electrons on N in the arylamines are not delocalised in the benzene ring
2. How many structural isomers are possible for C_3H_9N ?
 - (a) 4
 - (b) 2
 - (c) 5
 - (d) 3
3. Which of the following is incorrect for primary amines?
 - (a) On reaction with nitrous acid alkylamines produce alcohol
 - (b) On reaction with nitrous acid arylamines produce phenol
 - (c) Alkylamines are more basic than ammonia
 - (d) Alkylamines are more basic than arylamines
4. Aniline is less basic than
 - (a) Benzylamine
 - (b) Triphenylamine
 - (c) p-Nitroaniline
 - (d) Diphenylamine
5. Which of the following is formed when an alkyl primary amine reacts with nitrous acid?
 - (a) Alkyl nitrite
 - (b) Secondary amine
 - (c) Nitroalkane
 - (d) Alcohol
6. In which of the following reactions does amide get converted to amine?
 - (a) Claisen
 - (b) Hoffmann
 - (c) Kekule
 - (d) Perkin
7. This on reduction with $LiAlH_4$ produces secondary amine

(a) Methyl cyanide (b) Nitroethane (c) Methyl isocyanide (d) Acetamide

8. Which of the following is formed in the reaction of an aldehyde and primary amine?

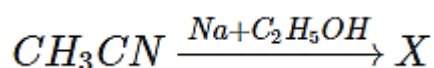
(a) Ketone (b) Aromatic acid (c) Schiff's base (d) Carboxylic acid

9. The amine formed from an amide by means of bromine and alkali has how many number of carbons atoms?

(a) Same number of C atoms as that of amide (b) One carbon atom less than that of the amide

(c) One more C atom than that of the amide (d) Two more C atoms than that of the amide

10. Which of the following options represent the compound X in this equation?



(a) CH_3CONH_2 (answer) $CH_3CH_2NH_2$ (c) C_2H_6 (d) CH_3NHCH_3

11. Ethylamine can be prepared by action of bromine and caustic potash on which compound?

(a) Acetamide (b) Formamide (c) Propionamide (d) Methyl cyanide

12. Reduction of nitroalkanes yield

(a) Alcohol (b) Acid (c) Amine (d) Diazo compounds

13. What is the name of the reaction when acetamide changes into methylamine?

(a) Huffman reaction (b) Friedel-Craft's reaction (c) Hofmann reaction (d) Hinsberg reaction

14. When methyl iodide is heated with ammonia, what is the product obtained?

(a) Methylamine (b) Dimethylamine (c) Trimethylamine (d) A mixture of Methylamine, Dimethylamine and Trimethylamine

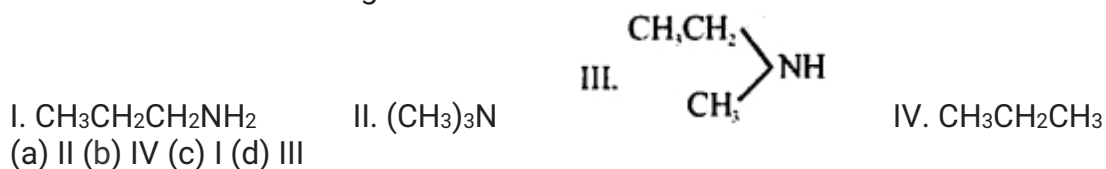
15. Which of the following compounds gives a secondary amine on reduction?

(a) Nitromethane (b) Nitrobenzene (c) Methyl isocyanide (d) Methyl cyanide

16. When ethanol is mixed with ammonia and passed over alumina the compound formed is which compound?

(a) $C_2H_5NH_2$ (b) C_2H_4 (c) $C_2H_5OC_2H_5$ (d) CH_3OCH_3

17. Which of the following should be most volatile?



18. Nitrogen atom of amino group is hybridised.

(a) sp (b) sp^2 (c) sp^3 (d) sp^3d

19. C_3H_8N cannot represent

(a) 1° ammine (b) 2° ammine (c) 3° ammine (d) quaternary ammonium salt

20. Identify the correct IUPAC name

- (a) $(\text{CH}_3\text{CH}_2)_2\text{NCH}_3$ = N-Ethyl-N-methylethanamine (b) $(\text{CH}_3)_3\text{CNH}_2$ = 2-methylpropan-2-amine (c) $\text{CH}_3\text{NHCH}(\text{CH}_3)_2$ = N-Methylpropan-2-amine (d) $(\text{CH}_3)_2\text{CHNH}_2$ = 2, 2-Dimethyl-N-propanamine

21. When excess of ethyl iodide is treated with ammonia, the product is

- (a) ethylamine (b) diethylamine (c) trimethylamine (d) tetraethylammonium iodide

22. Secondary amines can be prepared by

- (a) reduction of nitro compounds (b) oxidation of N-substituted amides (c) reduction of isonitriles (d) reduction of nitriles

23. Which of the following amides will give ethylamine on reaction with sodium hypobromide?

- (a) Butanamide (b) Propanamide (c) Acetamide (d) Benzamide

24. Tertiary amines have lowest boiling points amongst isomeric amines because

- (a) they have highest molecular mass (b) they do not form hydrogen bonds (c) they are more polar in nature (d) they are most basic in nature

25. Primary and secondary amines are distinguished by

- (a) Br_2/ROH (b) HClO (c) HNO_2 (d) NH_3

26. Arrange the following compounds in increasing order of basicity:

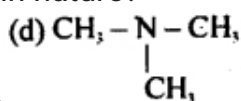
CH_3NH_2 , $(\text{CH}_3)_2\text{NH}$, NH_3 , $\text{C}_6\text{H}_5\text{NH}_2$

- (a) $\text{C}_6\text{H}_5\text{NH}_2 < \text{NH}_3 < (\text{CH}_3)_2\text{NH} < \text{CH}_3\text{NH}_2$ (b) $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH} < \text{NH}_3 < \text{C}_6\text{H}_5\text{NH}_2$
(c) $\text{C}_6\text{H}_5\text{NH}_2 < \text{NH}_3 < \text{CH}_3\text{NH}_2 < (\text{CH}_3)_2\text{NH}$ (d) $(\text{CH}_3)_2\text{NH} < \text{CH}_3\text{NH}_2 < \text{NH}_3 < \text{C}_6\text{H}_5\text{NH}_2$

27. Among the compounds $\text{C}_3\text{H}_7\text{NH}_2$, CH_3NH_2 , $\text{C}_2\text{H}_5\text{NH}_2$, and $\text{C}_6\text{H}_5\text{NH}_2$. Which is the least basic compound?

- (a) CH_3NH_2 (b) $\text{C}_2\text{H}_5\text{NH}_2$ (c) $\text{C}_3\text{H}_7\text{NH}_2$ (d) $\text{C}_6\text{H}_5\text{NH}_2$

28. Which of the following is amphoteric in nature?



- (a) CH_3NH_2 (b) CH_3NHCH_3 (c) CH_3CONH_2

29. The amines are basic in nature, hence they form salts with hydrochloric acid. Which of the following will be insoluble in dil. HCl ?

- (a) $\text{C}_6\text{H}_5\text{NH}_3$ (b) $(\text{C}_6\text{H}_5)_3\text{N}$ (c) $\text{C}_2\text{H}_5\text{NH}_2$ (d) CH_3NHCH_3

30. Primary, secondary and tertiary amines may be separated by using

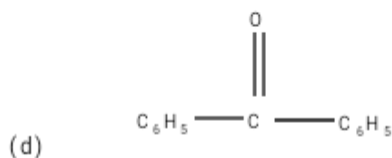
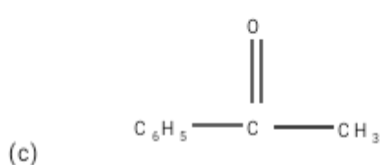
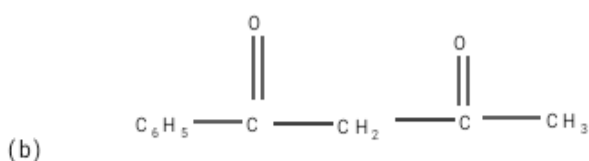
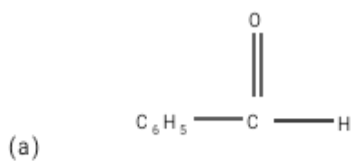
- (a) iodoform (b) diethyloxalate (c) benzene sulphonyl chloride (d) acetyl chloride

31. The strongest base among the following is

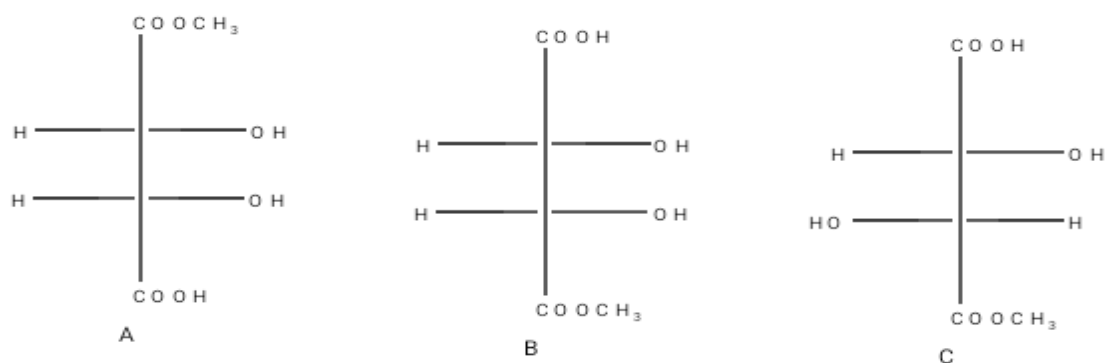
- (a) $\text{C}_6\text{H}_5\text{NH}_3$ (b) $p\text{-NH}_2\text{C}_6\text{H}_4\text{NH}_2$ (c) $m\text{-NO}_2\text{C}_6\text{H}_4\text{NH}_2$ (d) $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$

32. Protein are a group of found in all living matter (a) amine containing organic compound (b) amine containing inorganic compounds (c) nitrogen containing organic compounds (d) nitrogen containing inorganic compounds
33. The major components of protein include the following except (a) Oxygen (b) Nitrogen (c) Hydrogen (d) Chlorine
34. The peptide linkage in protein is between (a) amino group and carboxylic acids group of opposite amino acids (b) amino group and carboxylic acids group of adjacent amino acids (c) amino group and carboxylic acids group of same carbon amino acids (d) amino group and carboxylic acids group of similar amino acids
35. The chemical and physical properties of protein are derived from (a) the functional groups present (b) the reaction potential (c) electronegative elements acting as substituents (d) hybrid of properties of various amino acids
36. The simplest unit of protein is (a) Nitrogen (b) Amine (c) carboxylic acid (d) amino acid
37. Amino acids have characteristics (a) acidic (b) basic (c) neutral (d) a and b
38. The simplest amino acid is (a) glycine (b) alanine (c) valine (d) cysteine (amine)
39. The nature of amino acid is (a) ambivalent (b) amphoteric (c) basic (d) acidic
40. The following are classes of amino acids except (a) aromatic amino acids (b) essential amino acids (c) non-essential amino acids (d) aliphatic amino acids
41. Examples of essential amino acids include the following except (a) lysine (b) glycine (c) histidine (d) valine
42. Examples of non-essential amino acids include the following except (a) alanine (b) glycine (c) proline (d) arginine
43. Examples of neutral amino acids include the following except (a) alanine (b) glycine (c) lysine (d) methionine
44. Acidic amino acids have amino groups (a) 0 (b) 1 (c) 2 (d) 3
45. Acidic amino acids have carboxylic acids (a) 0 (b) 1 (c) 2 (d) 3
46. Basic amino acids have amino groups (a) 0 (b) 1 (c) 2 (d) 3
47. Basic amino acids have carboxylic acids (a) 0 (b) 1 (c) 2 (d) 3
48. Example of basic amino acid is (a) alanine (b) Proline (c) arginine (d) tyrosine
49. Major difference between essential amino acids and non-essential amino acids is that (a) essential amino acids can be synthesized in the body, while non-essential cannot be synthesized in the body (b) essential amino acids cannot be synthesized in the body, while non-essential can be synthesized in the body (c) essential amino acids cannot be obtained from diet, while non-essential can be obtained in the diet (d) essential amino acids can be synthesized in the vital organs of the body, while non-essential cannot be synthesized in the vital organs of the body
50. Example of aromatic amino acid is (a) Tyrosine (b) Proline (c) arginine (d) tyrosine

51. Example of aromatic amino acid is (a) Tyrosine (b) Proline (c) arginine (d) methionine
52. The following are forces that stabilize peptide bonds except (a) hydrophobic forces (b) hydrogen bond (c) ionic interaction (d) hydrophilic forces
53. One of the following cannot denature protein (a) heat (b) high pressure (answer) optimal pH (d) ionization radiation
54. When protein is denatured, it (a) becomes a coil (b) reverts to natural state (c) reverts to random coil state (d) becomes hard
55. One of the following is a method for testing protein (a) Biuret Test (b) Mellanine Test (c) Grignard Test (d) Adenosine Test
56. One of the following is not a method of chemical purification (a) filtration (b) centrifugation (c) Adsorption (d) halogenation
57. The compound which is not isomeric with diethyl ether is (a) *n*-propyl methyl ether (b) 1-butanol (c) 2-methyl-2-propanol (d) butanone
58. The maximum number of isomers for an alkene with the molecular formula C_4H_8 is (a) 2 (b) 3 (c) 4 (d) 0
59. Which of the following compounds will exhibit *cis-trans* (geometrical) isomerism? (a) 2-butene (b) 2-butyne (c) 2-butanol (d) butanal
60. The number of isomers of C_6H_{14} is (a) 4 (b) 5 (c) 6 (d) 7
61. Alkenes show geometrical isomerism due to: (a) asymmetry (b) rotation around a single bond (c) resonance (d) restricted rotation around a double bond
62. Keto-enol tautomerism is observed in



63. The number of isomeric alcohols having molecular formula $C_4H_{10}O$ is (a) 3 (b) 4 (c) 5 (d)
64. The correct statement about the compounds A, B and C



(a) A and B are identical (b) A and B are diastereomers (c) A and C are enantiomers (d) A and B are enantiomers

65. How many optically active stereoisomers are possible for butane-2, 3-diol? (a) 1 (b) 2 (c) 3 (d)

66. An enantiomerically pure acid is treated with racemic mixture of an alcohol having one chiral carbon. The ester formed will be (a) optically active mixture (b) pure enantiomer (c) meso compound (d) racemic mixture

67. The number of stereoisomers obtained by bromination of *trans*-2-butene is (a) 1 (b) 2 (c) 3 (d) 4

68. Which of the following compounds exhibits stereoisomerism? (a) 2-methylbutene-1 (b) 3-methylbutyne-1 (c) 3-methylbutanoic acid (d) 2-methylbutanoic acid

69. Which of the following compounds will exhibit geometrical isomerism? (a) 1-phenyl-2-butene (b) 3-phenyl-1-butene (c) 2-phenyl-1-butene (d) 1,1-diphenyl-1-propene

70. Optical isomers that are mirror images are called: (a) tautomers (b) diastereomers (c) enantiomers (d) metamers

71. Enantiomers have which of the following characteristics? (a) rotate ordinary light (b) have the same melting point (c) are superimposable mirror images (d) react with optically active molecules at the same rate

72. Which of the following statements is false about enantiomers? (a) rotate plane-polarized light (b) are superimposable mirror images (c) are non-superimposable mirror images (d) have the same melting point

73. A meso compound: (a) is an achiral molecule which contains chiral carbons (b) contains a plane of symmetry or a centre of symmetry (c) is optically inactive (d) is characterized by all of the above

74. Which of the following compounds will be optically active? (a) Propanoic acid (b) 3-Chloropropanoic acid (c) 2-Chloropropanoic acid (d) 3-Chloropropene

75. 2-Butanol is optically active because it contains: (a) an asymmetric carbon (b) a plane of symmetry (c) a hydroxyl group (d) a centre of symmetry

76. Which of the following represents a racemic mixture? (a) 75% (R)-2-butanol, 25% (S)-2-butanol (b) 25% (R)-2-butanol, 75% (S)-2-butanol (c) 50% (R)-2-butanol, 50% (S)-2-butanol (d) 35% (R)-2-butanol, 65% (S)-2-butanol

77. Consider (R)- and (S)-2-butanol. Which physical property distinguishes the two compounds?
 (a) melting point (b) solubility in common solvents (c) rotation of plane-polarized light (d) infrared spectrum
78. Which of the following is a true statement? (a) all chiral molecules possess a plane of symmetry. (b) all achiral molecules are meso. (c) all molecules which possess a single asymmetric center of the S configuration are levorotatory. (d) a mixture of achiral compounds will be optically inactive
79. Which of the following statements is correct concerning a pair of enantiomers? (a) they rotate the plane of polarized light by exactly the same amount and in opposite directions. (b) they rotate the plane of polarized light by differing amounts and in opposite directions. (c) they rotate the plane of polarized light by differing amounts and in the same direction. (d) they have different melting points.
80. Which of the statements is correct about diastereomers? (a) they are stereoisomers that are not enantiomers. (b) they are a pair of identical isomers. (c) they are a pair of isomers that are mirror images. (d) all their asymmetric centers are the same.
81. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OHCH}_3$ is a) propanol b) butanol c) 2-butanol d) none of the above
82. Dehydration of ethanol using conc H_2SO_4 produces a) ethane b) ethene c) propanol d) H_2SO_3
83. Isopropyl alcohol is an isomer of a) propanol b) propyl amine c) propanoic acid d) propionaldehyde
84. Methanol is a) primary alcohol b) dihydric alcohol c) sec-alcohol d) tert-alcohol
85. Triphenyl carbinol has a) one phenyl group b) two phenyl group c) 3 phenyl group d) no phenyl group.
86. $\text{C}_6\text{H}_5\text{CH}_2\text{Cl} + \text{aqNaOH}$ produces a) benzyl alcohol b) phenol c) benzaldehyde d) none of the above
87. $\text{CH}_3\text{CHO} + \text{CH}_3\text{MgBr} \longrightarrow$ yields a) primary alcohol b) sec-alcohol c) tert-alcohol d) dihydric alcohol.
88. Ethanol when fully oxidized with acidified KMnO_4 produces a) ethanal b) ethanoic acid c) ethane d) ethyne.
89. Warming a primary amine produces a primary alcohol and water as well as a) nitrogen oxide b) hydrogen molecule c) N_2O_4 d) nitrogen.

90. $\text{C}_2\text{H}_5\text{-O-C}_2\text{H}_5 + \text{H}_2\text{O} \rightarrow$ this reaction produces a) butanol b) ethanol c) ethanol d) none of the above.
91. The reaction between LiAlH_4 and cyclopentanone is a reduction process which produces a) cyclopentanoic acid b) cyclopentanal c) cyclopentanol d) none of the above.
92. LiAlH_4 , H_2/Ni , NaBH_4/H , these compounds can reduce a double bond and aldehyde at the same time in a molecule except a) LiAlH_4 b) H_2/Ni c) NaBH_4/H d) none of the above
93. Which of the following is not true about Lucas reagent a) HCl/ZnCl_2 b) test for acid c) test for alcohol d) test for type of alcohol
94. Acetone is also a) ethanone b) propanone c) butanone d) acetaldehyde.
95. The use of $\text{Zn}/\text{Conc HCl}$ in Clemmenson reduction converts carbonyl compound to a) alkene b) alkyne c) alcohol d) alkane.
96. The reaction of propanal $\text{CH}_3\text{CH}_2\text{CHO}$ and NH_2NH_2 is a condensation type which also produces hydrazone called a) propylhydrazone b) dimethyl hydrazone c) dipropyl hydrazine d) all of the above.
97. In the presence of a strong base two molecules of aldehyde react to give a) aldol b) two molecules of alcohols c) ketone d) ketone and aldehyde.
98. In all cases of reaction of ammonia derivatives and carbonyl compoundsis formed a) ammonia b) nitrogen c) water d) water and ammonia.
99. $\text{CH}_3\text{CH}_2\text{MgBr}$ is an example of a) reducing agent b) Grignard reagent c) oxidizing agent d) dehydrating agent.
100. Hoffman Degradation converts RCONH_2 to a) RNH_2 b) R_2NH c) R_3N d) none of the above